

# PSOC™ Control C3: Class B Self-Test Library (STL)

## Customer training workshop (CTW)

February 2026

public

# Table of contents


1 Functional safety overview 3

2 Self-Test Library (STL) overview 6

3 How to use STL 11

4 Summary 13



Copyright © Infineon Technologies AG 2026. All rights reserved.

# Table of contents


1 **Functional safety overview** **3**

2 Self-Test Library (STL) overview 6

3 How to use STL 11

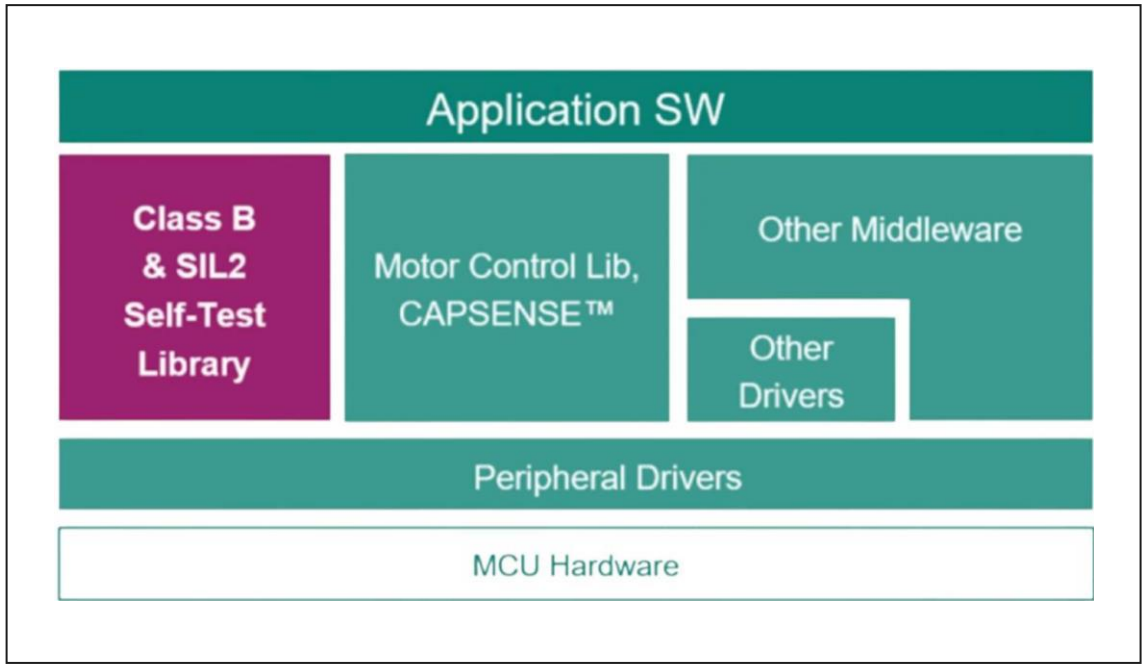
4 Summary 13



Copyright © Infineon Technologies AG 2026. All rights reserved.

# Why functional safety matters

- Electronic system complexity is rising dramatically in modern vehicles and industries
- Standards like ISO 26262 and IEC 61508 require robust diagnostic and fault-handling mechanisms
- Meeting SIL/ASIL levels depends on reliable hardware, diagnostics, and software-based tests





Copyright © Infineon Technologies AG 2026. All rights reserved.

# Introduction to functional safety

- Functional safety ensures systems operate safely even when faults occur
- Relevant standards: ISO 26262 (automotive), IEC 60730 (home appliances), IEC 61508 (industrial)
- Self-tests detect hardware faults early, enabling controlled system fallback or safe shutdown


Copyright © Infineon Technologies AG 2026. All rights reserved.

# Table of contents


1 Functional safety overview 3

2 **Self-Test Library (STL) overview** **6**

3 How to use STL 11

4 Summary 13



Copyright © Infineon Technologies AG 2026. All rights reserved.

# Self-Test Library (STL) overview

- STL provides a suite of software-based self-tests for safety-critical components
- Enhances safety-critical reliability by executing self-tests at startup and during operation
- STL, with UL Class B certification under IEC 60730, ensures compliance and reliability in embedded products


Copyright © Infineon Technologies AG 2026. All rights reserved.

# STL for ModusToolbox™

- UL Class B certification (IEC 60730)
- Production-ready, pre-tested library integrated with ModusToolbox™
- Modular architecture – use only required tests
- Includes result handlers and easy diagnostic integration


Copyright © Infineon Technologies AG 2026. All rights reserved.

# STL key features

The STL covers the full range of system-critical tests, including:

- **CPU registers:** Detect stuck bits; verify register integrity and accessibility
- **Program counter:** Ensure jumps land at correct addresses; validate control flow integrity
- **Program flow:** Check for correct firmware execution sequence and logical progression
- **Interrupt handling and execution:** Verify proper interrupt calling, nesting, timing, and periodicity
- **Flash (invariable memory):** Detect memory corruption, ensure code flash integrity
- **SRAM (variable memory):** Detect stuck bits, validate memory addressing and data integrity
- **Clock test:** Verifies system clock reliability
- **Stack overflow:** Monitor stack usage, detect overflow in conjunction with program data memory during execution
- **Digital I/O:** Verify pins for short circuits, confirm correct I/O behaviour


Copyright © Infineon Technologies AG 2026. All rights reserved.

# STL operational characteristics

- Support for power-on self-test and runtime cyclic testing
- Easy integration via ModusToolbox™
- High diagnostic coverage (DC ≥ 90%), meeting SIL 2 target
- Low impact on system performance due to non-intrusive execution
- Compatibility with RTOS scheduling (such as FreeRTOS timers)


Copyright © Infineon Technologies AG 2026. All rights reserved.

# Table of contents


1 Functional safety overview 3

2 Self-Test Library (STL) overview 6

3 **How to use STL** **11**

4 Summary 13



Copyright © Infineon Technologies AG 2026. All rights reserved.

# How to use STL

## Steps to use STL

1. Add the STL library to the ModusToolbox™ project.
2. Initialize using `STL_Init()`.
3. Run tests at startup or schedule them periodically.

## Example code

```
1. STL_Init();
2. if (!STL_CPURegisterTest()) { handle_error(); }
```


Copyright © Infineon Technologies AG 2026. All rights reserved.

# Table of contents


1 Functional safety overview 3

2 Self-Test Library (STL) overview 6

3 How to use STL 11

4 **Summary** **13**



Copyright © Infineon Technologies AG 2026. All rights reserved.

# Summary

STL simplifies safety compliance with:

- Minimal development effort
- Reduced validation overhead via UL Class B certification
- Broad coverage across core and peripheral components
- Easy adoption and integration into existing applications


Copyright © Infineon Technologies AG 2026. All rights reserved.

# References

- Self-Test Library: ModusToolbox™ STL
- Application note: AN241136: PSOC™ Control C3 Class B safety software library
- Code example: Class B Safety Test, Core peripherals


Copyright © Infineon Technologies AG 2026. All rights reserved.

# Revision history

| Document revision | Date | Description of change |
|---|---|---|
| ** | 2026-02-03 | Initial release. |


Copyright © Infineon Technologies AG 2026. All rights reserved.


Infineon